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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

Published:

— with international search report

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TABLET DISPENSER FOR DISPENSING INDIVIDUAL TABLETS

The invention relates to a dispenser for holding and dispensing discrete items such as confectionery, food supplements, pharmaceuticals and other such tablet sized products, and is more particularly concerned with a manually operable dispenser.

A number of manually operable dispensers for dispensing discrete items are known. These generally suffer from the problem that they are complicated and expensive to produce because they contain a number of working parts. A number also suffer from the problem that at least part of the dispensing mechanism is open to the external environment and so can become contaminated or damaged leading to possible hygiene or jamming problems.

EP-A-1038797 discloses a pocket dispenser for products such as sweets and pills. This has a storage space, an outlet and a dispensing mechanism for dispensing a predetermined number of products from the storage space, via the opening, when the dispensing mechanism is energised by the user. The dispenser is composed of an exchangeable cartridge, comprising the storage space and the dispensing mechanism, and a holder detachably connected therewith.

US 2653706 discloses a dispensing container for items such as tablets and the like which dispenses these items one at a time from an ordered array of the items in the container. The dispenser dispenses single items without exposing the other items in the container to contaminants. It is

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operated by pressing together the top and bottom of the container which lifts an item to be dispensed into the outlet allowing it to be removed from the container.

US 5405047 discloses a dispenser for dispensing pills or tablets one at a time from an unarranged stock. Items are dispensed by forcing a first part of the dispenser into a second part. This results in a trough-like bottom end wall, closing the dispensing channel, being passed free of a partition so dispensing a tablet.

FR-A-2659300 discloses a box fitted with a device for dispensing the products contained therein one by one. The box has a bottom and a lid, having an opening for dispensing products, and a member for actuating the dispensing device and the cover associated with the opening allowing retention or removal of the products one by one.

DE-U-9005757.0 discloses a dispenser for dispensing single items comprising a storage space, and an opening designed to take a single item. The body is composed of upper and lower portions slidable longitudinally relative to another so as to open the opening to allow a single item to be dispensed.

An object of the present invention is to provide an improved dispenser which can enable the above disadvantages to be obviated or mitigated.

According to a first aspect of the present invention there is provided a dispenser comprising

- (i) a container body,

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- (ii) a storage region which is disposed within the container body and which in use contains a multiplicity of items to be individually dispensed,
- (iii) a dispensing outlet,
- (iv) a passage between the storage region and the dispensing outlet,
- (v) a valve member disposed between said storage region and said outlet and moveable transversely in said passage between an open position and a closed position,
- (vi) a stop member spaced from said valve member so as to define a passage region of a size to accommodate an item to be dispensed, said stop member being moveable into and out of a closed position in which it prevents passage of an item through said passage region, and
- (vii) manually operable means for moving said valve member and said stop member, the arrangement being such that (1) when the manually operable means is operated to move said valve member into its open position said stop member is moved into its closed position, and (2) when the said valve member is in its closed position said stop member is in a position in which it permits passage of an item.

The stop member may be located on either side of the valve member so as to define said passage region, but preferably is located upstream of the valve member. In this preferred embodiment, when said valve member is in its open position, said stop member is in a closed position thereby preventing the passage of an item through the said passage region by preventing the item from entering the latter. However, if the stop member is located downstream of the valve member, then it prevents passage of an

item through said passage region by preventing it from leaving the latter. Whilst said passage region may be of a size to receive more than one item from the storage region, it is preferably of a size to accept only a single item so that the items can be dispensed singly.

Preferably the container body is comprised of a pair of moulded body parts and may be of any desired size and shape, but preferably of a size and shape which can be easily held in the hand.

Preferably, within the passage in the region of the dispensing outlet, there is defined a retaining region which, when the dispenser is held in a predetermined orientation, temporarily retains the dispensed item until it is required to be discharged from the outlet.

Preferably the valve member is formed integrally with the manually operable means.

In a second aspect of the present invention, there is provided a dispenser comprising

- (i) a hollow body,
- (ii) a storage region which is defined within the hollow body and which in use contains a multiplicity of items to be individually dispensed,
- (iii) a dispensing outlet in the hollow body,
- (iv) a passage in the hollow body between the storage region and the dispensing outlet,
- (iv) a valve within the body for controlling the flow of items through the passage from the storage region to the dispensing outlet, and

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(v) manually operable means for operating the valve, said manually operable means being integrally formed with a surrounding wall region of the hollow body.

By providing the manually operable means integrally with the body, there are no joints in this region into which dirt can enter to interfere with operation of the manually operable means.

Conveniently, the manually operable means comprises a button which is connected with the surrounding wall region of the body by means of an integral resilient wall region. Preferably, the valve includes a valve member which is within the body and integrally formed with the manually operable means.

More preferably, the dispenser according to said second aspect of the invention has the features of the dispenser according to said first aspect. In such an arrangement, the stop member is preferably integrally formed with said manually operable means.

Preferably deformation of said localised wall region results in the opening of an internal valve which is formed integrally with said wall region, and closing of a stop member to prevent multiple items being dispensed.

In a third aspect of the present invention, there is provided a dispenser comprising

- (i) a hollow body,
- (ii) a storage region which is defined within the hollow body and which in use contains a multiplicity of items to be individually dispensed,

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- (iii) a dispensing outlet in the hollow body,
- (iv) a passage in the hollow body between the storage region and the dispensing outlet,
- (iv) a valve within the body for controlling the flow of items through the passage from the storage region to the dispensing outlet,
- (v) manually operable means for operating the valve, and
- (vi) retaining means within the passage adjacent to the dispensing outlet for temporarily retaining an item which has passed through the valve within the body adjacent to said outlet.

Preferably, the retaining means is disposed so that, in use, an item temporarily retained thereby is visible by viewing through the outlet.

An embodiment of the present invention will be described by way of an example with reference to the accompanying drawings, in which:-

Fig.1 is a schematic longitudinal sectional view from the front of one example of a dispenser according to the present invention,

Fig.2 is a schematic longitudinal sectional view from the side of the dispenser of Fig.1,

Fig.3 is a front view of the dispenser of Figs.1 and 2,

Fig.4 is a side elevation of the dispenser of Figs.1 to 3,

Fig.5 is a schematic cross-sectional view of the dispenser of Figs.1 to 4,

Fig.6 is a schematic longitudinal sectional view from the front of a different example of the dispenser according to the present invention, and

Fig.7 is a schematic longitudinal sectional view from the side of the alternative dispenser of Fig.6.

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Referring now to Figs. 1 to 5, the dispenser illustrated therein is a first embodiment intended for dispensing individual confectionery items C such as small cylindrical mints. The dispenser comprises a flattened ovoid-shaped hollow body 10 having an upper storage region 12 in which the confectionery items C are stored, and a lower dispensing outlet 14. The dispenser further includes a valve indicated by arrow 16 for controlling the passage of items C to the outlet 14, and a stop plate 17 for ensuring that only one item C can be dispensed each time the valve 16 is opened.

The hollow body 10 is formed of moulded synthetic plastic front and rear shells 18 and 20. These are retained together by means of pins press fitted into holes 50 in this example, but may alternatively be held together by means of snap fit connectors (not shown). The base of the storage region 12 is defined within the body 10 by means of a shaped internal wall 22 with downwardly and inwardly sloping outer regions leading to a central throat 24. The throat 24 has a laterally curved base wall 26 with an aperture 28 therethrough. The wall 22 and the throat 24 are integrally moulded with the rear shell 20 so as to extend forwardly of the shell wall. The base wall 26 with the aperture 28 forms part of the valve 16. A shelf 29 is also integrally formed with the rear shell 20. The shelf 29 extends laterally across the storage region 12 above the shaped internal wall 22 and projects approximately halfway into the storage region 12. The shell 20 is also integrally moulded with internal, laterally spaced, parallel ribs 30 extending longitudinally within the throat 24. The upper ends of these ribs 30 are curved (see Fig.2) so as to direct an item C toward the throat 24.

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Spaced below the ribs 30 and the base wall 26 are further internal ribs 32 which extend towards the lower end of the body 10 where the outlet 14 is located. The mutually adjacent longitudinal ends of the ribs 30 and 32 are shaped so as to define a laterally curved, forwardly opening slot 33. The ribs 32 are integrally moulded with the rear shell 20 and possess outer walls 48 which help to define the slot 33 and a passage region 46 which is spaced below the base wall 26. The ribs 30 and 32 serve to stiffen the rear shell 20 and to facilitate passage of the items C.

The front shell 18 is moulded with a localised region defining a manually operable push button 34 which is integrally connected to the remainder of the shell 18 by a surrounding resilient region 36 of relatively thin section such that the push button 34 can be depressed. The stop plate 17 is integrally moulded with the front shell 18 so as to project rearwardly from the internal surface of the push button 34 towards the shell 20 at a location which is just below the upper end of the throat 24. The plate 17 is rectangular and is so dimensioned that, in the position illustrated in Fig. 2, it projects into the throat 24 towards the ribs 30 but not to such an extent that it prevents a confectionery item C in the storage region 12 from passing to the bottom of the throat 24 and resting on the base wall 26. The shell 18 also has integrally moulded laterally spaced longitudinal ribs 35 on the rear of the push button 34. Like the ribs 30 the upper ends of the ribs 35 are curved so as to act in conjunction with the ribs 30 to assist in directing the item C to the throat 24, and also reinforce the push button 34 to reduce deformation during use.

The mutually facing inner edges of the ribs 30 and 35 are profiled so as to define, together with the parts of the wall 22 defining the throat, a passage

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of cross-sectional shape which approximates to the outline of the confectionery item C (see Fig.5), but which is appropriately larger to allow only a single confectionery item C to pass the stop plate 17 and rest on the base wall 26.

The internal wall 22 is spaced from the front shell 18 sufficiently to permit depression of the push button 34.

Also forming part of the valve 16 is a valve element 38 which is integrally moulded with the front shell 18 so as to extend rearwardly from the push button 34. The valve element 38 is disposed above the passage region 46 and abuts against the underside of the base wall 26. As can be seen from Fig. 1, the valve element 38 is laterally curved so as to conform to the shape of the base wall 26 and to that of the slot 33 in which it engages. The valve element 38 has an aperture 40 therethrough which, when the push button 34 is not manually pressed, is sufficiently misaligned with the aperture 28 in the base wall 26 for confectionery items C to be incapable of passing through the apertures 28 and 40.

The outlet 14 is defined in the front shell 18 which is integrally moulded with an internal pocket 41 defining a downwardly inclined deflecting flange 42 above the outlet 14 and a lipped pocket region 43 below the outlet 14. The internal pocket 41 has an upwardly opening aperture 44 therein which lies under and is spaced from the aperture 40.

It will be appreciated from the above, that a passage is defined within the body 10 which extends between the storage region 12 and the outlet 14, such passage being defined by (i) the throat 24, (ii) the passage region 46

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below the valve 16, (iii) the aperture 44 and (iv) the interior of the pocket 41. The valve element 38 and the stop plate 17 are movable transversely with respect to such passage.

In use, with the push button 34 in a relaxed or un-depressed condition, the stop plate 17 and the valve element 38 are in the positions illustrated in Figs 2 and 5 thereby allowing a single confectionery item C to fall to the bottom of the throat 24 without passing through the misaligned apertures 28 and 40 when the dispenser is held in an upright orientation as illustrated in Fig. 1.

When it is desired to dispense a confectionery item C, the push button 34 is manually depressed inwardly. This can conveniently be effected using one hand only by holding the dispenser in the hand or between the thumb and forefinger, and pressing the thumb against the push button 34. This causes the valve element 38 to slide rearwardly within the slot 33 relative to the base wall 26 so as to abut against the base of slot 33. In this position the apertures 28 and 40 are sufficiently aligned for the confectionery item C in the bottom of the throat 24 to pass therethrough. However, depression of the push button 34 also causes the stop plate 17 to move rearwardly toward the ribs 30 so as to prevent any further confectionery items C from passing to the bottom of the throat 24 and through the aligned apertures 28 and 40.

Provided that the body 10 is held substantially upright, the confectionery item C which has passed through the passage region 46 and the aperture 44, will drop into the pocket 41 so as to be retained in the internal lipped pocket region 43. Thus, the confectionery item C retained in this pocket

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region 43 can simply be tipped out of the outlet 14 into the hand or mouth by appropriate tilting of the body 10.

When manual pressure on the push button 34 is relaxed, the resilience of region 36 causes the push button 34 to return to its original position so causing the apertures 28 and 40 to become misaligned once more and also to permit another confectionery item C from the storage region 12 to fall to the bottom of the throat 24.

The shelf 29 reduces the weight of items C acting on the dispensing mechanism. This provides for a more reliable functioning of the dispenser by permitting the items C to move more freely above the dispensing mechanism.

Referring now to Figs.6 and 7, the dispenser illustrated therein is a second embodiment of the dispenser intended for dispensing individual confectionery items C such as small cylindrical mints. Components corresponding to those in the first embodiment have been given corresponding numbers, with only the variations being described. As in the first embodiment the dispenser comprises a flattened ovoid-shaped hollow body 10 having an upper storage region 12 in which the confectionery items C are stored, and a lower dispensing outlet 14. The dispenser further includes a valve indicated by arrow 16 for controlling the passage of items C to the outlet 14, and a stop means which in this embodiment are in the form of a pair of ribs 117, replacing stop plate 17, for ensuring that only one item C can be dispensed each time the valve 16 is opened.

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The hollow body 10 is formed of moulded synthetic plastic front and rear shells 18 and 20. In this embodiment, the shells 18 and 20 are retained together by means of pins press fitted into holes 50, and are tamper evident. The internal wall 22 with downwardly and inwardly sloping outer regions also defines part of the central throat 24. The throat 24 has a flat base wall 26 with an aperture 28 therethrough. A control member 129 is integrally formed with the rear shell 20 above the entrance to the throat 24. This control member 129 replaces wall 29 and extends forwardly of the storage region 12 towards the front shell 18. The control member 129 helps to ensure that confectionery items C are correctly orientated for entry into the throat 24.

The shell 20 is also integrally moulded with internal, laterally spaced, parallel ribs 130 extending longitudinally within the throat 24. The upper ends of these ribs 130 are angled (see Fig.7) so as to direct an item C toward the throat 24. The ribs 130 are shaped so as to allow only a single item C into the throat 24, further items C being held above the throat 24 by the shape of the ribs 130.

The lower ends of the ribs 130 and the internal wall 22 are shaped so as to define a forwardly opening slot 33. The ribs 130 and internal wall 22 serve to stiffen the rear shell 20 and to control passage of the items C through the throat 24. The internal walls 22 also serve to define a passage region 46 below valve 16.

The stop means 117 is integrally moulded with the front shell 18 so as to project rearwardly from the internal surface of the push button 34, as described in the first embodiment, towards the shell 20 and define the

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front of the throat 24. The ribs 117 are mutually parallel and are dimensioned so that, in the position illustrated in Fig. 7, they project into the throat 24 towards the ribs 130 but not to such an extent that they prevent a confectionery item C in the storage region 12 from passing to the bottom of the throat 24 and resting on valve element 38. Like the ribs 130, the upper ends of the ribs 117 are shaped so as to act in conjunction with the ribs 130 to assist in directing the item C to the throat 24. The ribs 117 also reinforce the push button 34 to reduce deformation thereof in use. The front shell 18 also has a pair of integrally moulded guide plates 152 formed above and perpendicular to the valve element 38. These are a close sliding fit in respective recesses 22a in the external surfaces of wall 22 and ensure controlled inward depression of the push button 34.

The mutually facing inner edges of the ribs 130 and the ribs 117 are profiled so as to define, together with the parts of the wall 22 defining the throat, a passage of cross-sectional shape which approximates to the outline of the confectionery item C but which is appropriately larger to allow only a single confectionery item C to pass into the throat 24 and rest on valve element 38.

The internal wall 22 is spaced from the front shell 18 sufficiently to permit depression of the push button 34.

The valve element 38 is integrally moulded with the front shell 18 so as to extend rearwardly from the push button 34. The valve element 38 is disposed in the throat 24 above the base wall 26 and abuts against it. Unlike the previous embodiment, as can be seen from Fig. 6, the valve

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element 38 is flat as is the base wall 26 and the slot 33 in which it engages.

The outlet 14 is defined in the front shell 18. The rear shell 20 is integrally moulded with an internal pocket 41 and a lipped pocket region 43 below the outlet 14.

It will be appreciated from the above, that a passage is defined within the body 10 which extends between the storage region 12 and the outlet 14, such passage being defined by (i) the throat 24, (ii) the passage region 46 below the valve 16, (iii) and the interior of the pocket 41. The valve element 38 and the ribs 117 are movable transversely with respect to such passage.

In use, with the push button 34 in a relaxed or un-depressed condition, the ribs 117 and the valve element 38 are in the positions illustrated in Fig 7 thereby allowing a single confectionery item C to fall to the bottom of the throat 24.

When it is desired to dispense a confectionery item C, the push button 34 is manually depressed inwardly. As well as allowing a confectionery item C to be dispensed, depression of the push button 34 also causes the ribs 117 to move rearwardly toward the ribs 130 so as to prevent any further confectionery items C from passing to the bottom of the throat 24 and through the aligned apertures 28 and 40.

Although not shown in the drawings, each of the mutually facing surfaces of the base wall 26 and the valve element 38 has a small transverse rib

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positioned so that, as the valve 16 opens, an audible click is produced when the rib on the valve element 38 passes over the rib on the base wall 26.

It will be appreciated from the above that the whole of the dispenser is defined by only two mouldings, which enables it to be manufactured very economically with a minimum of external joints which allow ingress of contaminants. Additionally, the dispenser is simple and convenient to operate with one hand.

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Claims

1. A dispenser comprising:-
 - (i) a container body,
 - (ii) a storage region which is disposed within the container body and which in use contains a multiplicity of items to be individually dispensed,
 - (iii) a dispensing outlet,
 - (iv) a passage between the storage region and the dispensing outlet,
 - (v) a valve member disposed between said storage region and said outlet and moveable transversely in said passage between an open position and a closed position,
 - (vi) a stop means spaced from said valve member so as to define a passage region of a size to accommodate an item to be dispensed, said stop means being moveable into and out of a closed position in which it prevents passage of an item through said passage region, and
 - (vii) manually operable means for moving said valve member and said stop means, the arrangement being such that when the manually operable means is operated to move said valve member into its open position said stop means is moved into its closed position, and when the said valve member is in its closed position said stop means is in a position in which it permits passage of an item.
2. A dispenser according to claim 1 in which the stop means is located upstream of the valve member.

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3. A dispenser according to claim 1 in which the stop means is located downstream of the valve member.
4. A dispenser according to claim 1 to 3, wherein said passage region is of a size to accept only a single item.
5. A dispenser according to any preceding claim, wherein the container body is comprised of a pair of moulded body parts.
6. A dispenser according to any preceding claim, wherein the container body is of a size and shape which can be held in the hand.
7. A dispenser according to any preceding claim, wherein there is defined a retaining region which, when the dispenser is held in a predetermined orientation, temporarily retains the dispensed item until it is required to be discharged from the outlet.
8. A dispenser according to any preceding claim, wherein the valve member is formed integrally with the manually operable means.
9. A dispenser according to any preceding claim, wherein a control member is positioned above said passage region so as to assist in orientating an item to be dispensed correctly for entry into said passage region.
10. A dispenser comprising
 - (i) a hollow body,

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- (ii) a storage region which is defined within the hollow body and which in use contains a multiplicity of items to be individually dispensed,
 - (iii) a dispensing outlet in the hollow body,
 - (iv) a passage in the hollow body between the storage region and the dispensing outlet,
 - (v) a valve within the body for controlling the flow of items through the passage from the storage region to the dispensing outlet, and
 - (vi) manually operable means for operating the valve, characterised in that said manually operable means is integrally formed with a surrounding wall region of the hollow body.
11. A dispenser according to any preceding claim, wherein the manually operable means is formed integrally with the body.
12. A dispenser according to any preceding claim, wherein the manually operable means comprises a button.
13. A dispenser according to any preceding claim, wherein the manually operable means is connected with the surrounding wall region of the body by means of an integral resilient wall region.
14. A dispenser according to any preceding claim, wherein the valve includes a valve member which is within the body and integrally formed with the manually operable means.
15. A dispenser according to any preceding claim, wherein the stop means is integrally formed with said manually operable means.

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16. A dispenser according to any preceding claim, wherein deformation of said integral resilient wall region results in the opening of internal valve which is formed integrally with said wall region, and closing of stop means to prevent multiple items being dispensed.

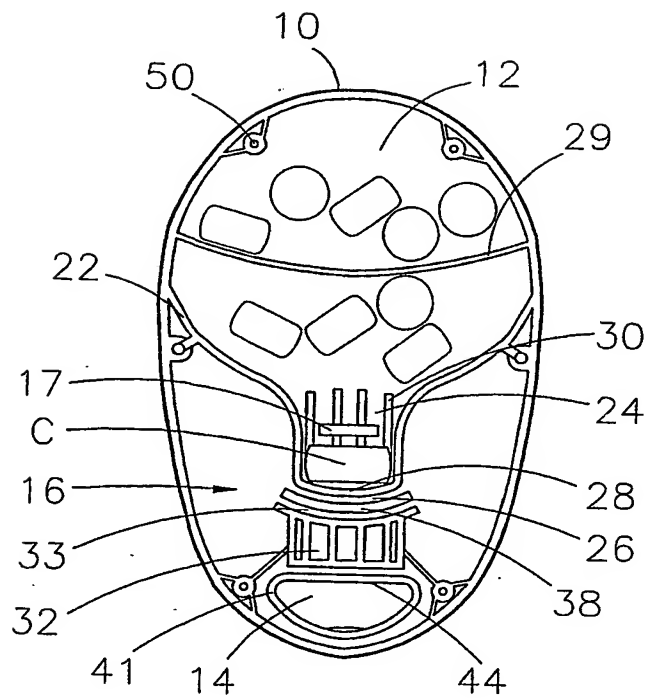


FIG 1

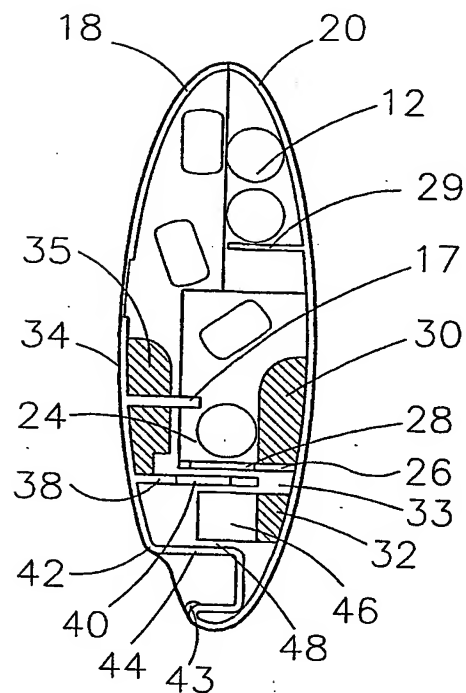


FIG 2

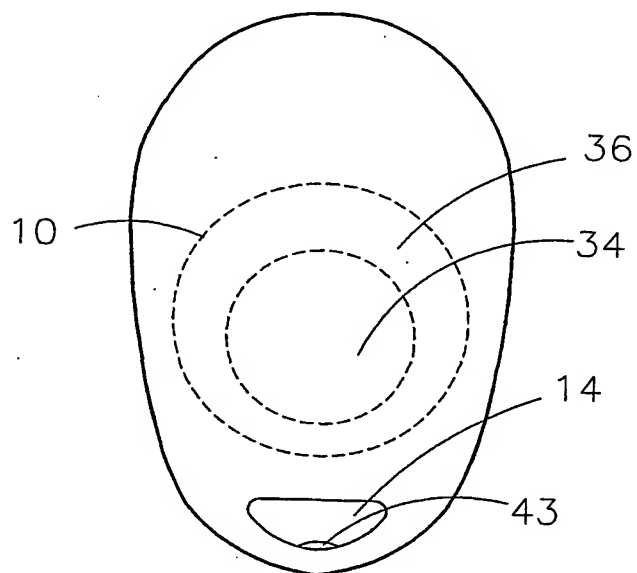


FIG 3

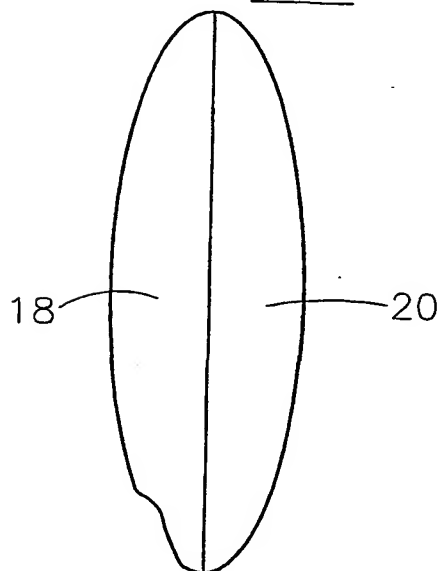


FIG 4

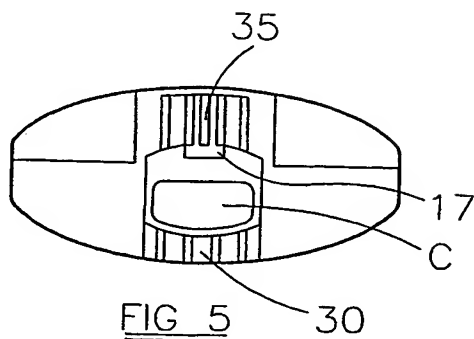
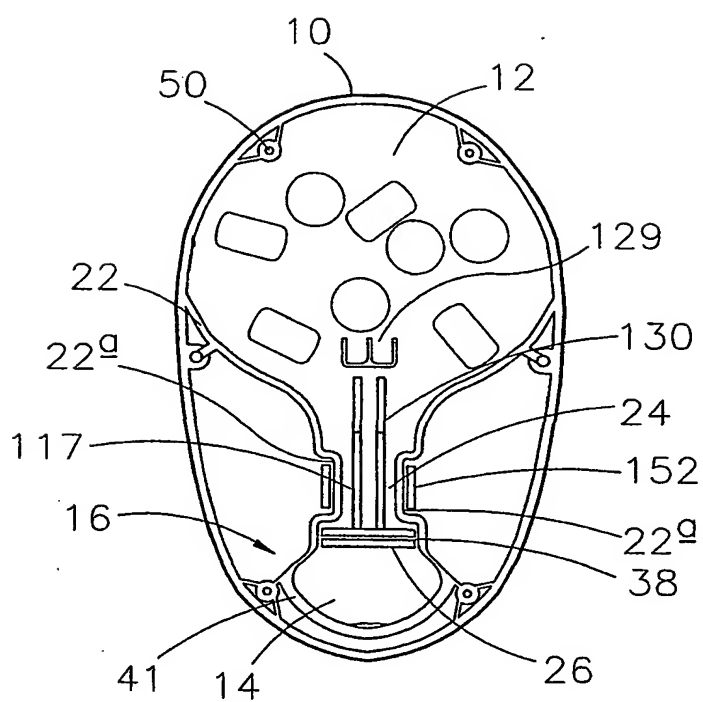
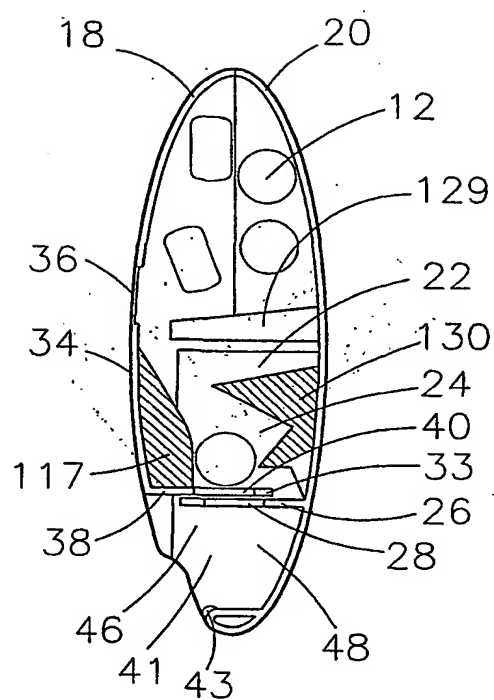


FIG 5

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FIG 6FIG 7

INTERNATIONAL SEARCH REPORT

International Application No

PCI/GB 01/04560

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 B65D83/04

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 B65D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	FR 2 659 300 A (BOURBON COMMUNICATION) 13 September 1991 (1991-09-13) abstract; figures	1, 10
A	DE 90 05 757 U (GALLINA) 2 August 1990 (1990-08-02) claim 1; figures	1, 10
A	US 2 653 706 A (AGGSON ROBERT E) 29 September 1953 (1953-09-29) claim 1; figures	1, 10
A	EP 1 038 797 A (LEE DE NV SARA) 27 September 2000 (2000-09-27)	
A	US 5 405 047 A (HANSEN IB) 11 April 1995 (1995-04-11)	

☐ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

* Special categories of cited documents:

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- *&* document member of the same patent family

Date of the actual completion of the international search

5 December 2001

Date of mailing of the international search report

20/12/2001

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

SERRANO GALARRAGA, J

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/GB 01/04560

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July 16, 1968

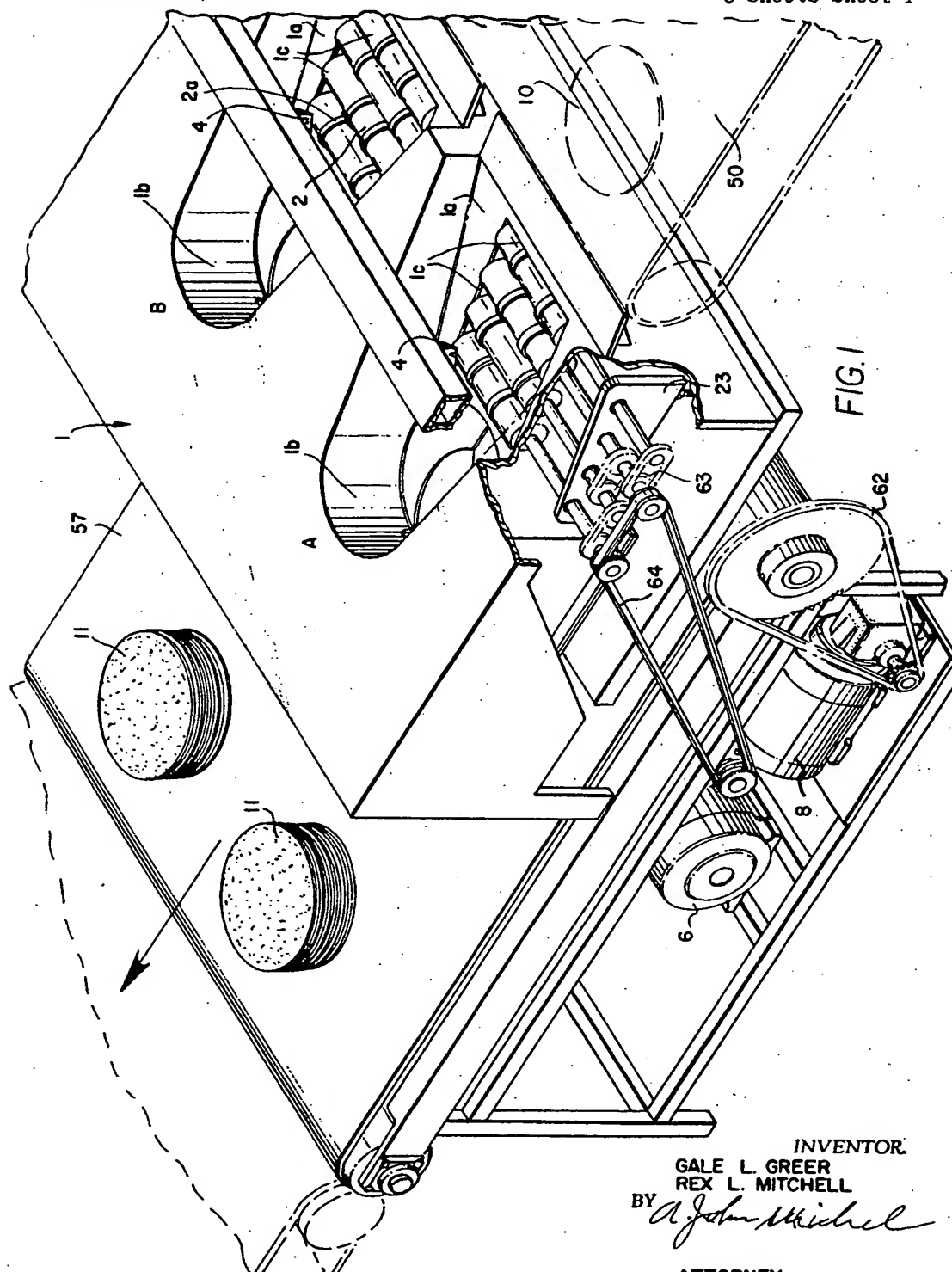
R. L. MITCHELL ET AL

3,392,853

HIGH SPEED COUNTING AND STACKING APPARATUS

Filed Nov. 8, 1966

3 Sheets-Sheet 1



INVENTOR:
GALE L. GREER
REX L. MITCHELL
BY *A. John Mitchell*
ATTORNEY

July 16, 1968

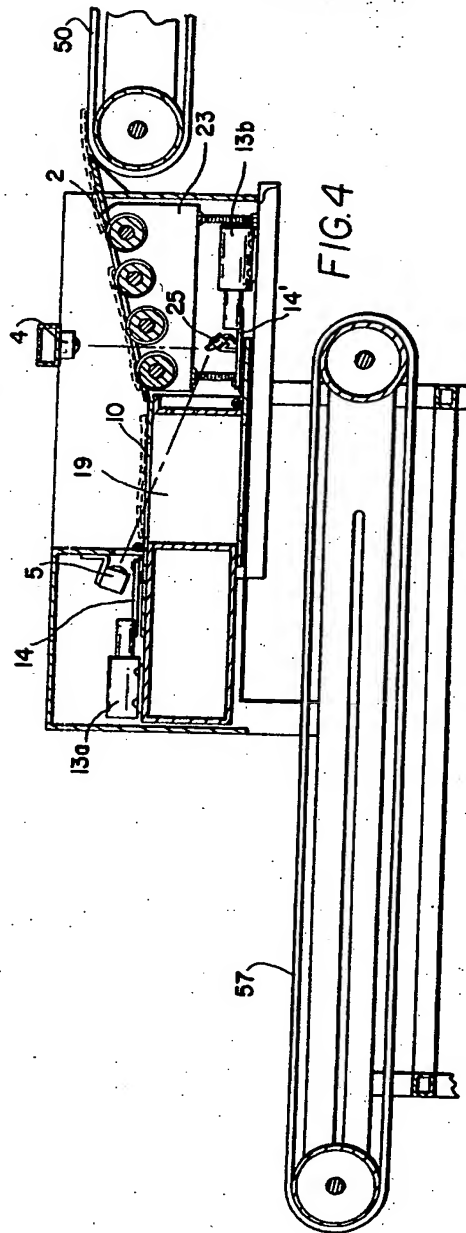
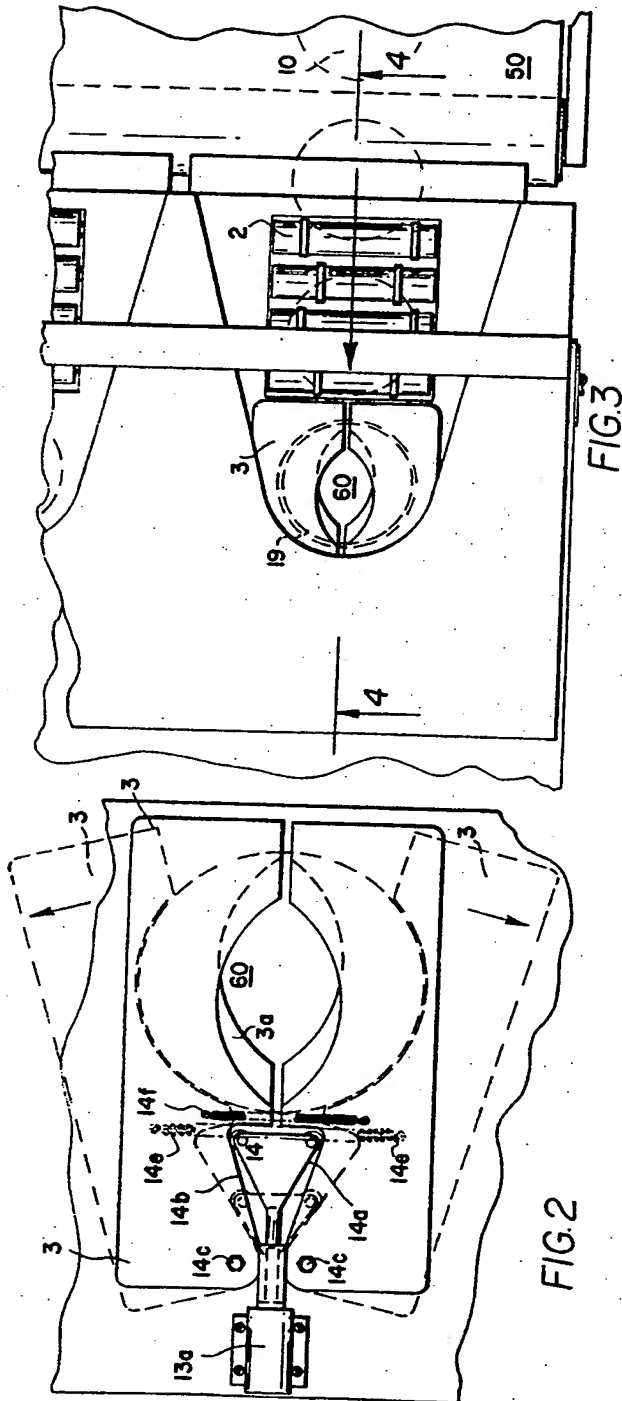
R. L. MITCHELL ET AL

3,392,853

HIGH SPEED COUNTING AND STACKING APPARATUS

Filed Nov. 8, 1966

3 Sheets-Sheet 2



INVENTOR.
GALE L. GREER
REX L. MITCHELL
BY *A. John Michel*
ATTORNEY

July 16, 1968

R. L. MITCHELL ETAL

3,392,853

HIGH SPEED COUNTING AND STACKING APPARATUS

Filed Nov. 8, 1966

3 Sheets-Sheet 3

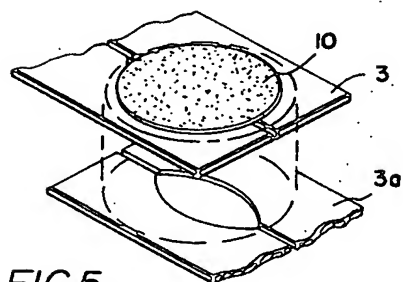


FIG. 5

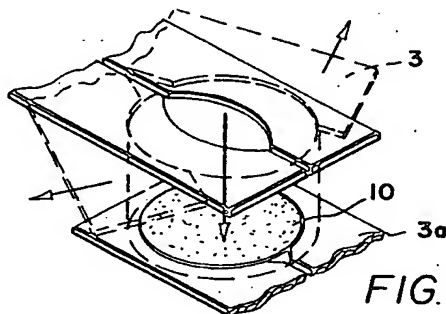


FIG. 6

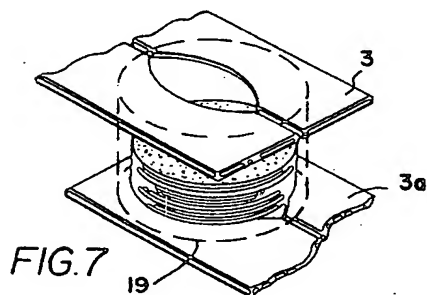


FIG. 7

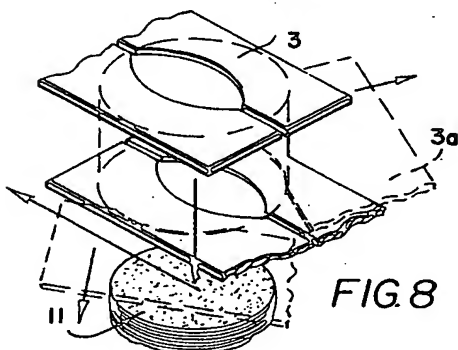


FIG. 8

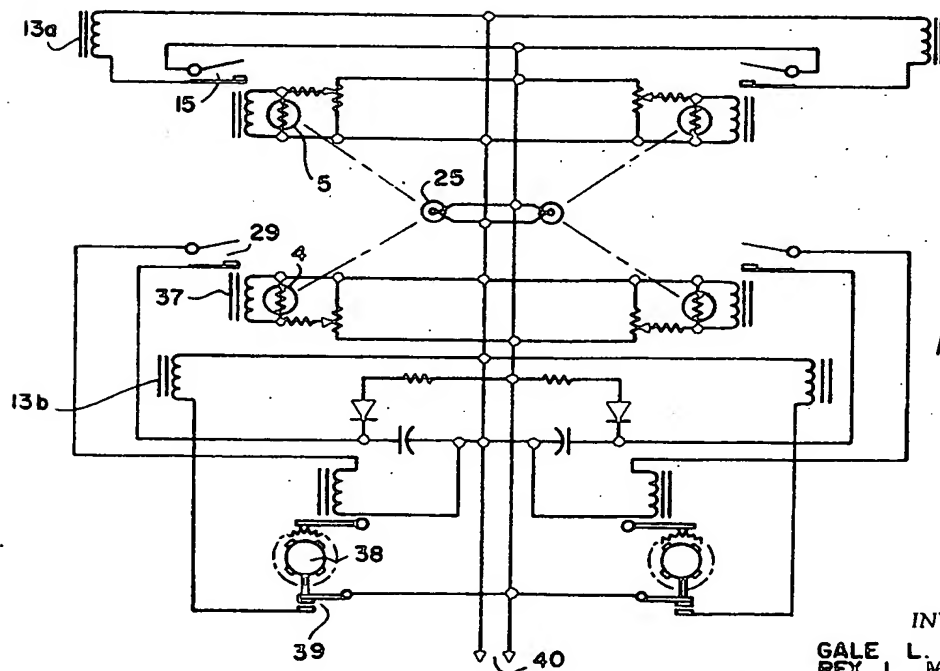


FIG. 9

INVENTOR
GALE L. GREER
REX L. MITCHELL
BY *R. John Mitchell*
ATTORNEY

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3,392,853

HIGH SPEED COUNTING AND STACKING APPARATUS

Rex L. Mitchell, 3815 E. Fairmount, Phoenix, Ariz.
85018, and Gale L. Greer, 6625 E. Cypress, Scotts-
dale, Ariz. 85257

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ABSTRACT OF THE DISCLOSURE

A high-speed apparatus for automatically counting and stacking a predetermined number of flat objects such as tortillas and other disc-like objects. An electric light source is mounted to have its light beam interrupted by the passing objects whereby two photocells control the flow of electric current through a solenoid whose plunger sequentially opens and closes horizontal receiving and discharge doors upon which said objects are deposited in sequence. These doors are positioned one above the other; the upper door opens each time a flat object is deposited thereupon, and the lower door opens after a desired number of objects has been counted and stacked thereupon.

This invention relates to a counting apparatus and more particularly to an apparatus for the high speed automatic counting and stacking of objects such as tortillas, sandpaper discs, metal discs, etc., into a predetermined grouped quantity for packaging.

It is a common practice in the manufacture of tortillas and similar products to package such products in predetermined quantities, such as a dozen, two dozen, and so forth, to a package. Such products are counted either by hand or by weight. Packaging by weight is inaccurate, and usually overweighing is resorted to in order to pack at least the required number of objects in a package. Hand packaging is expensive as well as inaccurate, and where the objects to be packaged are fragile, there is the further drawback of possible damage to such objects.

Accordingly, it is an object of the present invention to provide an object counting and stacking machine which will avoid the above disadvantages, and which will enable the objects to be counted and stacked at high speed into predetermined grouped quantities for packaging.

Another object of this invention is to provide an apparatus of the above type which will handle articles of various sizes.

Another object of this invention is to provide an apparatus for stacking of fragile articles, such as tortillas and the like, without damaging the articles during the handling process.

A further object is to provide an apparatus of the above type in which the number of articles to be stacked may be predetermined and easily changed.

For the purpose of explaining a preferred embodiment of the invention, reference is made to the following drawings in which:

FIGURE 1 is a diagrammatic view of one embodiment of the counting and stacking machine;

FIGURE 2 is a plan view of the object positioning doors, and the door opening and closing means;

FIGURE 3 is a plan view of the positioning doors and the feed rollers which supply the objects to the stacking mechanism;

FIGURE 4 is a sectional view taken along line 4—4 of FIGURE 3;

FIGURES 5, 6, 7 and 8 show the succession of the operating stages of the stacking mechanism; and

FIGURE 9 shows a circuit diagram of a suitable control circuit for use in the apparatus of our invention.

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In the following description of the present invention, (a) similar numerals refer to similar parts in the several views, and (b) except for FIGURES 1 and 9, the description has reference to one single unit of the invention, it being understood by those skilled in the art that in commercial use the invention may consist of any suitable plurality of units such as units A and B which are shown in part in FIGURES 1 and 9, and which may be substantially identical with each other except that the roller driving means and conveyer driving means shown at 6, 8, 62 and 63 of FIGURE 1 are utilized to drive any desired number of individual units instead of two units as shown in FIGURE 1.

As shown in FIGURES 1, 2 and 4, unit cover 1 has a substantially rectangular shaped body including a downwardly slanting guide 1a and a pair of wells 1b. The sides of each well converge rearwardly and stop at a curved inner end. The slanting guides 1a have a rectangular shaped opening 1c to expose the top portion of each of the feed rollers 2.

The feed rollers 2 are mounted in suitable mounting plates 23 and are connected, e.g. by a chain and sprocket drive 63, to a belt 64 driven by a variable speed motor 6.

In operative relation with the frame of the counting apparatus thus far described, there are provided two endless conveyer bands shown at 50 and 57 respectively, 50 being the input or feed conveyer for the objects to be processed, and 57 the output conveyer for the objects having been counted and stacked.

As best shown in FIGURES 3 and 4, the invention further comprises a light source 25 and two light sensitive devices such as photocells 4 and 5, these elements being so arranged that the objects to be counted will pass between the light source and the photocells as the objects progress from right to left (FIG. 4), driven by the feed rollers 2. To insure a positive grip or contact of the feed rollers 2 with the objects 10 to be counted and stacked without causing damage to the articles in case they are of a fragile nature such as tortillas, for example, the feed rollers are provided with circumferential rubber treads or bands as shown at 2a of FIGURE 1.

FIGURES 2 and 5 through 8 show the object positioning, guiding and stacking device. As shown, each device comprises an upper door or shutter 3 and a lower door or shutter 3a, of which 3 is actuated by the electric control mechanism 13a, and the lower door 3a is actuated by the electric control mechanism 13b. Since the two control mechanisms are substantially identical in their construction, only one of them is illustrated in FIGURE 2. As shown, solenoid 13a actuates a plunger 14 the outer portion of which has the shape of a wedge 14a which is adapted to move in the triangular opening 14b of the door or shutter member 3. Two pivots 14c are provided so that, when the core or plunger 14 is pulled inwardly by the energization of the solenoid 13a, the doors will pivot around points 14c and will open to the position shown in dotted lines in FIGURES 2 and 6; this, in turn, will cause the object 10 to drop through the door opening to the bottom of the stacking guide or container 19. The duration of the opening period is just sufficient to permit the unloading of the object, whereupon springs 14e pull the doors back to the closed position; 14f shows the springs in retracted position.

To correlate and control the timing of the various steps of the apparatus described, there are provided electric circuit elements including relay 37, stepping mechanism 38, light source 25, photocells 4 and 5, and the other circuit elements shown in FIGURE 9. The circuit shown is connected to a suitable source of power as shown conventionally at 40. The stepping mechanism 38 is adapted to be preset to close a circuit through switch 39, after for example, twelve objects are counted and registered

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by the stepping mechanism. The closure of switch 39 causes current to flow through solenoid winding 13b, thereby actuating the lower doors 3a as described above.

The operation of the automatic counting and stacking apparatus of the invention is substantially as follows:

The input conveyer belt 50 carries the objects 10 to be counted and stacked in the direction of the arrow, so that they may be engaged by the feed rollers 2 and moved into the path of the light beam emanating from light source 25 (FIG. 4) said beam being received by photocells 4 and 5 respectively. The relay 37 in the control circuit (FIG. 9), is not energized when light is incident on photocell 4. However, when the light is interrupted by the passage of the object 10 between the light source and the photocell 4, relay 37 is operated to close its contacts 29 and to feed current to the stepping mechanism 38. Mechanism 38 is adapted to step and thus rotate its ratchet by one tooth when the coil of relay 37 is de-energized. Thus, each object is automatically counted as it moves past the light source 25, upon the upper doors 3 of the stacking mechanism 39. The light beam emanating from source 25 passes freely through aperture 60 (FIGS. 2 and 3) when no object upon the door 3 obstructs the passage of the beam. But when the door 3 is loaded by an object, as described above, the light beam is interrupted, and photocell 5 closes its contact 15 to send current through solenoid 13a, thus opening the upper door 3 and permitting the object to drop into stack box 19. When the number of objects which have accumulated in stack box 19 equals the predetermined setting of the stepping mechanism, switch 39 automatically closes its contacts, solenoid 13b is energized, and the lower doors 3a of stack box 19 are opened, thus dropping the entire stack, containing the desired number of objects, upon the output conveyer 57, ready for packing.

Having now particularly described and ascertained the nature of our invention and the manner in which it is to be performed, it will be understood by those skilled in the art that the above description is illustrative rather than restrictive and that changes and modifications may be made without departing from the scope thereof as set forth in the appended claims.

We claim:

1. An apparatus for counting and stacking objects into predetermined quantities, comprising, in combination,

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input means for feeding said objects singly in a row in which each object succeeds a preceding object, output means for said objects when arranged in stacks, a source of light adapted to impinge a beam of light upon each of two light sensitive means, counting means operatively connected to said light sensitive means to count each of said objects upon exposure to said light sensitive means, said counter means being adapted to be preset so that upon the accumulation of a desired number of objects a release mechanism is actuated to drop said number of objects upon said output means, object stacking means for stacking a desired number of objects, said stacking means comprising upper and lower doors, said upper doors comprising means for opening said doors automatically when the light source indicates a loaded condition on said door, and said lower door comprising means for automatically opening said door when said counting device indicates the accumulation of said desired number of objects, said door opening and closing means being of substantially similar construction and including an electromagnetic device actuated upon the passage of electric current there-through to move the core of said device, said core being integral with a wedge-shaped cam element movable in a triangular cut out portion in such a manner that the core and wedge device cause each half of the door to pivot about a fulcrum suitably provided on each of said half doors.

2. Apparatus as claimed in claim 1, in which the contour of the aperture of the upper and lower shutter mechanisms is so dimensioned that where the object to be counted and stacked is of a fragile nature, said aperture contour and the gravity of said object will cooperate to insure a faultless descent of said object into the stacking means below, and thence upon the stack output means.

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ROBERT G. SHERIDAN, *Primary Examiner*.

R. J. SPAR, *Assistant Examiner*.

